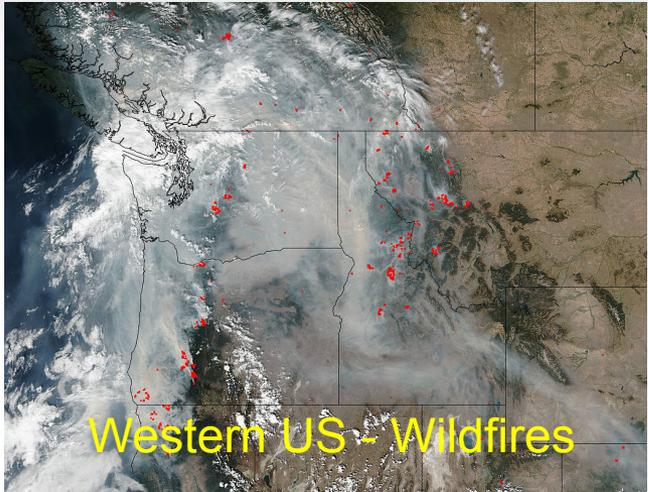
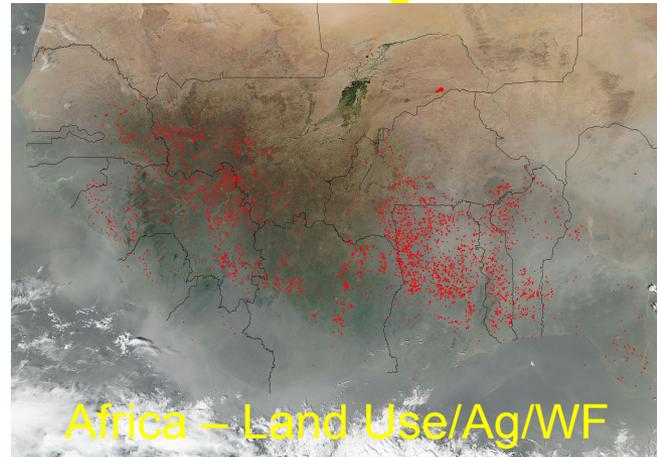
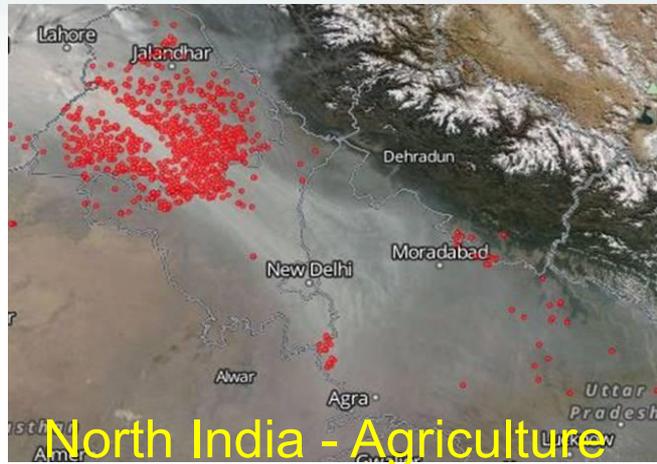
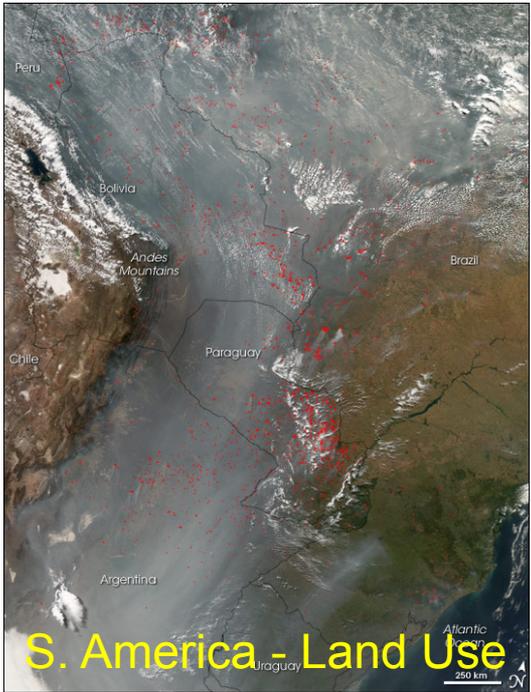


# Biomass Burning (BB) Aerosol Processes: Integrating ARM Field & Laboratory Studies to Inform E3SM Parameterizations

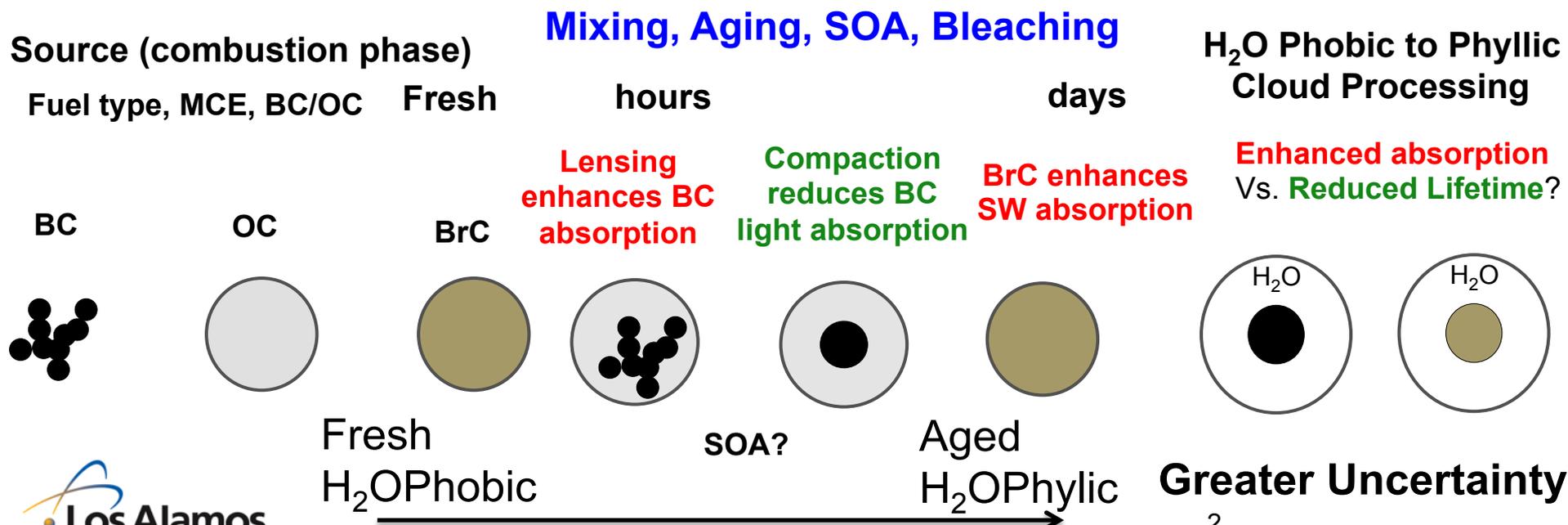
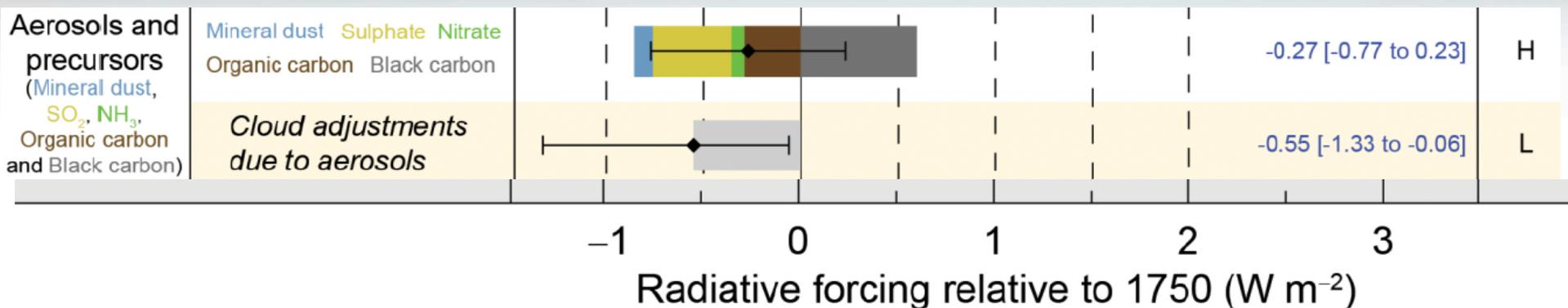
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# Warming by Absorbing Carbon Aerosols Offsets Cooling by Organics: Non Linear Dynamic Mixing/ Aging & Variability of Aerosols is Very Uncertain

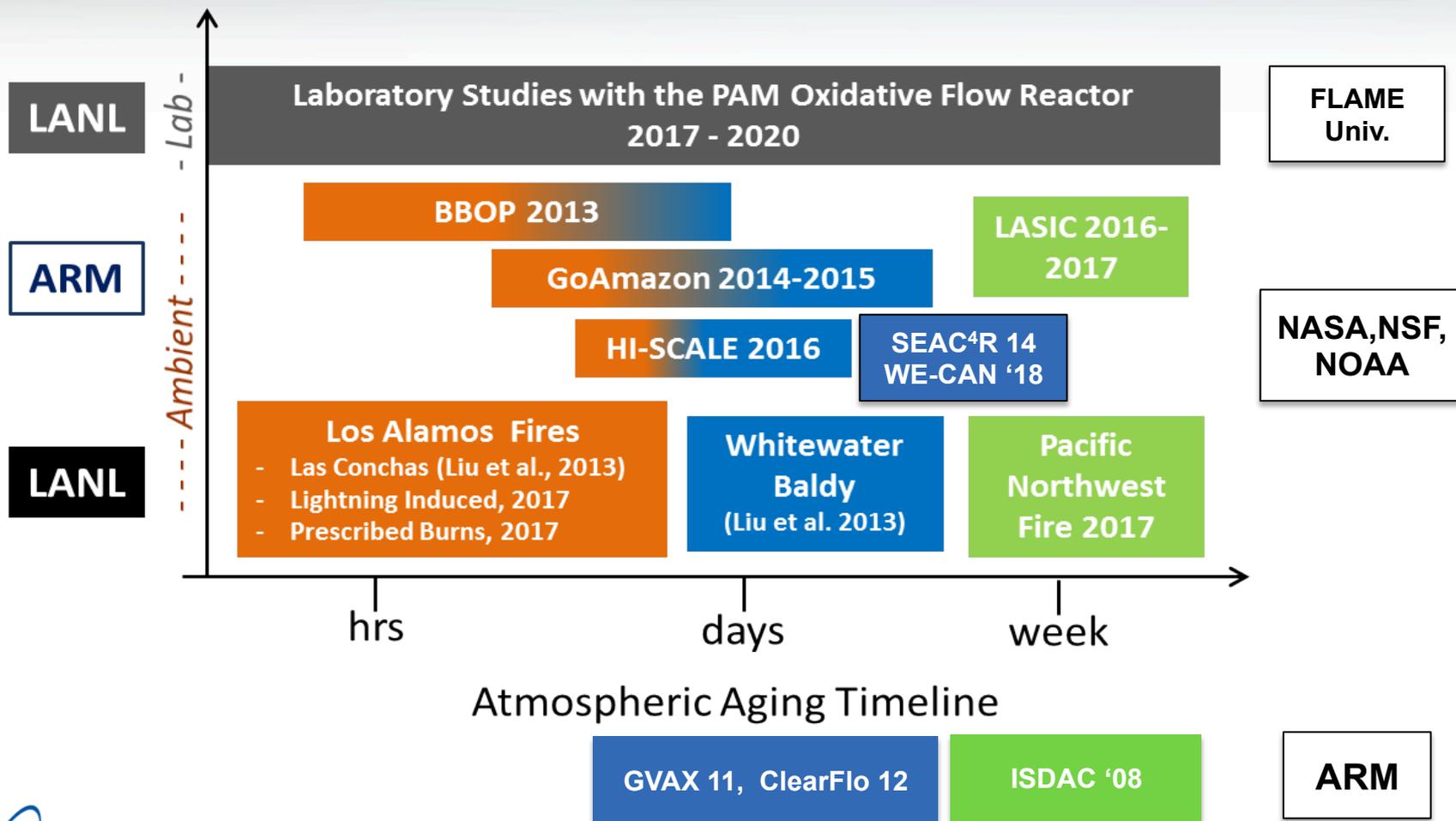


**Greater Uncertainty**

# Questions: Processes to Parameterizations

- How do emissions, dilution, photo-chemistry and humidity interact to control BBCA evolution & their properties?
- What instrumental and observational gaps limit our ability to quantify BBCA processes? How can we fill them “effectively”?
- How do all these processes effect the direct and indirect radiative forcing by BBCAs?
- How do BBCA climate relevant properties scale with region (ecosystem), time (age) and size (large vs. small) of fire?
- What sub-grid scale processes and properties are uncertain or missing in current models ? How to add them as scale-aware parameterizations?
  - Detailed mechanism from lab. that are validated by field data
  - Reduced mechanism for use in climate models

# Harness ARM Campaigns: Biomass Burning Field and Laboratory Data to Elucidate BBCA processes



Atmospheric Aging Timeline

# Outcome: ARM Report & Overview Publication

- Main Discussion
- Key Findings
  - Errors and Gaps in BBCA processes & model parameterizations
- Decisions
  - Strategies to fill them both
- Issues
  - How to surmount instrument, sampling & computational limits
- Needs
  - Coordinated Laboratory-Field-Model across scales (WRF-MOSAIC through CAM-5) and collaboration with other BB campaigns.
- Future Plans
  - Paper, Intensive/Extensive studies, Bridge LES-WRF-CAM-5
- Action Items
  - Cross-cutting ARM focus group, propose field/lab IOPs

# Agenda

- 1.30-1.35 *M. Dubey and S. Jathar*: Objectives and Outcome
- 1.35-1.45 *M. Shrivastava*, Constraining BB SOA in models: Uncertainties in Measurements and modeling parameters
- 1.45-1.55 *Jose Jimenez*, Net SOA formation from BB plumes in field studies, comparison to lab studies, and implications for global models
- 1.55-3.05 Highlight DOE Measurement & Model Results & Activities (5 min, 1-2 slides each)
- A. Zelenyuk*, Physicochemical BB aerosol properties: shape, density, composition & volatility
  - Qi Zhang*, Formation & aging of BB organic aerosols: Results from field observation
  - R. Chakravarty*, BB C-Aerosol Lab. Observations: Insights into Processes Parameterizations
  - C. Mazzoleni*, Tar Ball from BB: SEM morphological studies
  - A. Sedlacek*, Formation & evolution of Tar Balls & their optical & volatility properties
  - L. Kleinman*, BBOP analysis: Process level results
  - P. Zuidema/A. Aiken*, Status of LASIC single-scattering-albedo measurement assessment
  - L. Fierce*, Particle resolved analysis of BB
  - M. Dubey/C. Cappa*, Water uptake by BB smoke: Competing Lifetime & Absorption Effects
  - T. Onasch*, Field and laboratory measurements of biomass burning from BBOP to FIREX
  - S. Jathar/C. Cappa*, Results from FIREX: Links to DOE ASR/ARM data & activities
  - R. Wernis/A. Goldstein/M. Shrivastava*, Emissions/Variability of SVOCs from BB
  - M. Shirawa/D. Knoff*, Modeling OH/NO<sub>3</sub> heterogeneous reactions of levoglucosan
  - Y. Feng*, Representation of aerosol absorption from BB in CAM5
- 3.05-3.30 Discussion, Path Forward and Write-up (ARM report and draft for publication)